

SPORTS PROTECTIVE GEARRelated Application

[0001] This application claims priority to U.S. Provisional Application No. _____ [Attorney docket DAREDEV.126PR], entitled Sports Protective Gear, filed July 9, 2003, the entirety of which is hereby incorporated by reference.

Background of the InventionField of the Invention

[0002] The present invention relates to protective gear. More specifically, the invention relates to protective gear having a low friction surface treatment adapted to readily slide over a dry surface.

Description of the Related Art

[0003] Hockey is a fast-moving, competitive sport involving extensive contact between players and implements such as sticks and pucks. Hockey goalkeepers encounter a particularly high level of such contact as players attempt to advance the puck into a goal guarded by the goalkeeper. The goalkeeper attempts to prevent the puck from entering the goal by catching the puck or blocking it with a hockey stick, handheld blocker pad, and/or the goalkeeper's body. Accordingly, hockey goalkeepers wear an extensive amount of protective gear to protect their body from injury that may result from impacts with a fast moving puck.

[0004] To block a puck moving along the playing surface, a goalkeeper will often drop to one or both knees with his feet spread apart so that one or more leg pads contacts the playing surface. The puck cannot pass between the pad and the playing surface and thus will be blocked from entering the goal. When in this position, a goalkeeper may wish to shift or otherwise adjust the position of his legs. For example, the goalkeeper may wish to slide a leg pad over the playing surface to another position in front of the goal. Friction between the playing surface and the leg pad resists such a shift or slide. On an ice playing surface, the frictional resistance is relatively low, and the goalkeeper does not encounter much resistance to sliding the leg pad over the playing surface in order to shift his position. On a dry playing surface, such as a surface for playing roller hockey, the friction between the playing surface

and the goalkeeper's leg pad is relatively high. As such, friction forces will prevent, slow, or otherwise impair sliding shifts by the goalie. Thus, the goalie must expend a much greater effort to slide his pad over the playing surface than if there were minimum to low friction. As such, it can be expected that the goalkeeper's sliding movement in shifting his position may be slower or the goalkeeper may have to lift the pad off of the playing surface to change its position.

Summary of the Invention

[0005] Accordingly, there is a need in the art for a protective gear system that protects a roller hockey goalkeeper's legs, but which slides with relatively low friction over a playing surface.

[0006] In accordance with one embodiment, the present invention comprises a protective leg member for a hockey goalkeeper. The leg member has a front, a first side and a second side. At least one padding segment is disposed on the first side. A low friction surface treatment is disposed on the first side padding segment. The surface treatment has relatively low friction when in contact with a dry playing surface. As such, the first side of the leg member is readily slidable over a dry playing surface.

[0007] In another embodiment, the at least one padding segment comprises a cover, and the low friction surface treatment comprises a layer portion attached to the outer cover. The layer portion has a lower coefficient of friction than the cover.

[0008] In accordance with another embodiment, the a leg protection system is provided. The system comprises a leg portion adapted to fit about the wearer's leg. The leg portion has a front and a side. A low friction surface portion is disposed on the side of the leg portion. The low friction surface is adapted to readily slide over a dry playing surface.

[0009] In one embodiment, the side of the leg portion corresponds to an inner leg of the wearer.

[0010] In accordance with a still further embodiment, a protective member is configured to be attached to a wearer's leg. The protective member includes a front, a back, a first side and a second side. The first and second sides extend between the front and the back. The first side comprises means for reducing friction between the first side and a dry playing surface so that the first side slides readily over the dry playing surface.

Brief Description of the Drawings

[0011] FIGURE 1 is a perspective view of a leg protection member adapted to be attached to a hockey goalkeeper's left leg.

[0012] FIGURE 2 is a side elevation view of a first, inner side of the leg protection member illustrated in FIGURE 1.

[0013] FIGURE 3 is a side elevation view of a second, outer side of the leg protection member illustrated in FIGURE 1.

[0014] FIGURE 4 is a cross-sectional view of a padding segment of the leg protection member, taken along line 4-4 of FIGURE 2, illustrating a low friction surface treatment disposed on the padding segment.

Detailed Description of Preferred Embodiments

[0015] With first reference to Figures 1-3, a leg protection member 10 is illustrated. The illustrated leg protection member 10 is specially configured to be attached to a hockey goalkeeper's left leg. Preferably, a symmetrical leg protection member is configured to be attached to the hockey goalkeeper's right leg. The illustrated leg protection member 10 comprises a front 12, a back 14, a first side 20, and a second side 22. The member 10 is configured so that, when worn, the back 14 is disposed against the front of the wearer's leg; the front 12 is disposed opposite the back 14 and faces away from the wearer, and the first and second sides 20, 22 extend between the front 12 and back 14. The first side 20 is configured to be disposed adjacent the hockey player's inner leg and the second side 22 is disposed adjacent the outer leg.

[0016] The leg protection member 10 comprises several padding segments 24. Each padding segment preferably comprises an impact absorbent material 26 such as foam, an elastomer, or the like. The impact absorbent material 26 can also comprise a substantially rigid material such as a rigid plastic plate alone or in combination with a foam.

[0017] Preferably, at least some of the padding segments 24 are hinged relative to one another so that adjacent segments can pivot or otherwise move relative to one another. Throughout this specification, the term "hinged padding segments" is a broad term that is used in accordance with its ordinary meaning and includes, for example, adjacent padding segments that are attached to one another, but remain movable relative to one another.

[0018] With reference to FIGURE 4, one example of a hinged padding segment 24 is illustrated. As shown, the segment comprises a relatively thick impact absorbent material 26 sandwiched between an inner liner 28 and an outer cover 30. The outer cover 30 is fastened to the inner liner 28 by a stitching 32 on either side of the padding material 26. The stitching 33 facilitates bending of the outer cover 30 and the inner liner 28, and thus provides a pivot between adjacent padding segments 24. In one embodiment, the padding material 26 comprises waffle-type foam material processed in any suitable manner. The inner liner 28 and outer cover 30 preferably comprise a flexible textile such as a suitable synthetic material like DuPont Cordura™ nylon, manufactured by E.I. du Pont de Nemours and Company or other materials such as Clarino, natural or synthetic leather, polyvinylchloride (PVC) and polyurethane (PU). Preferably, the outer cover 30 extends over multiple adjacent padding segments 24.

[0019] It is to be understood that hinged padding segments 24 can be constructed in accordance with any desired method so that adjacent padding segments can be moved relative to one another. For example, in another embodiment, hinged padding segments comprise uncovered foam segments attached to a common flexible substrate.

[0020] With continued reference to Figures 1-3, the front 12 of the leg protection member 10 comprises a foot portion 34, a lower leg portion 36, an upper leg portion 40 and a knee portion 42. In the illustrated embodiment, the portions are arranged to generally conform to the anatomy of a relaxed human leg. Each of the front foot 34, lower leg 36, upper leg 40 and knee 42 portions comprise at least one hinged padding segment 24 so as to facilitate movement of the portions relative to one another and thus decrease resistance to movement of a player wearing the leg protection member 10. The knee portion 42 comprises a plurality of knee hinged segments 46 so as to better facilitate bending of the wearer's knees.

[0021] The first side 20 of the leg padding protection member 10 comprises several first side hinged padding segments 50 arranged adjacent one another and extending from an upper end 52 of the leg protection member 10 to a toe end 54 of the leg protection member. Preferably, the first side segments 50 are arranged so as to be capable of lying generally flat on a playing surface. In the illustrated embodiment, the first side padding segments 50 are generally triangular. It is to be understood that, in other embodiments, the

first side hinged padding segments can have other shapes. In a still further embodiment, the entire first side of a leg protection member can comprise a single padding segment.

[0022] A generally rigid calf guard 56 extends rearwardly from the intersection of the first side 20 and the back 14 of the leg protection member 10. Preferably, the calf guard 58 comprises a generally rigid protective plate therein. An upper thigh guard 58 also extends rearwardly from the intersection of the first side and back. Several straps 60 also extend from the intersection of the first side and the back.

[0023] The second side 22 comprises a plurality of second side hinged padding segments 62. In the illustrated embodiment, the second side 22 includes an upper leg padding segment 64, a lower leg padding segment 66, and a toe padding segment 68. A plurality of buckles 70 extend rearwardly from the intersection of the second side 22 and the back 14. The buckles 70 are configured to releasably engage the straps 60 so as to enable a wearer to releasably attach the leg protection member 10 to his leg.

[0024] A pair of calf pads 72 extend rearwardly from the back 14 of the leg protection member 10. The calf pads 72 are configured to fit on opposite sides of the wearer's calf. Preferably a strap 74 extends between the pads 72 and is affixed with a hook-and-loop fastener such as Velcro™ so as to enable the user to secure the calf pads around his calf. In a similar manner, a pair of lateral knee pads 78 extend rearwardly from the back 14 and are configured to be disposed on opposite sides of the wearer's knee. Still further, an upper thigh pad 80 extends from the back 14 and is configured to lie against the wearer's upper thigh. The upper thigh pad 80 additionally includes a strap 82 having a hook portion 84 and a loop portion 86 that are configured to engage one another to help secure the pad 80 to the wearer.

[0025] With reference again to Figures 2 and 4, the first side hinged padding segments 50 additionally comprise a low friction surface treatment 90. In the illustrated embodiment, the low friction surface treatment 90 comprises a relatively flat layer portion 92 of material adhered to the outer liner 30 of each of the hinged segments 50. The low friction layer portion 92 preferably has a relatively low coefficient of friction. Thus, the low friction layer portion 92 is configured to slide readily over a dry playing surface.

[0026] As used in this description the term "low friction surface treatment" is a broad term which is used in accordance with its ordinary meaning and which includes, without limitation, a surface configured to have relatively low friction. For example, a low friction surface treatment includes one or more separately formed layers, patches or the like attached to a surface, and can also comprise a portion or surface of a member which has been chemically or mechanically altered to lower its coefficient of friction.

[0027] The term "dry playing surface" as used in this discussion is a broad term which is used in accordance with its ordinary meaning and which includes any non-water playing surface such as a surface suitable for roller sports. Such a surface includes, but is not limited to, wood, cement, asphalt, and polymers such as high impact polypropylene, and also includes proprietary surfaces such as those currently available under the trademarks Sport Court™ A*Tak™, Matéflex™, and Ice Court™.

[0028] In accordance with one embodiment, the low friction surface treatment 90 comprises a layer of flexible polymer. The low friction surface treatment preferably comprises a material selected to have a relatively low coefficient of friction so as to be readily slidable over a playing surface. For example, in one embodiment, the low friction surface treatment comprises a material that is readily slidable over a playing surface constructed of high impact polypropylene. In accordance with another embodiment, the low friction surface treatment comprises a hard plastic member sewn or otherwise adhered to the hinged segment. In the illustrated embodiment, the low friction surface treatment 90 comprises a layer 92 of polymer about 1-4mm thick. In another embodiment, the layer is about 1.8-3mm thick.

[0029] The illustrated low friction layer portion 92 has been heat bonded onto the outer liner 30 of a first side hinged padding segment 50. It is to be understood that, in other embodiments, a low friction surface treatment can comprise a layer portion or several such portions attached to a padding segment by adhesive, sewing, and other processes such as deposition or sputter coating. The low friction surface treatment can comprise any surface that has been chemically or mechanically altered to lower its coefficient of friction. For example, the outer liner 30 of the hinged segments 24 can be chemically or mechanically altered to lower its coefficient of friction. In still further embodiments, the padding material

26 of the hinged segments may not be covered by an outer layer, and the padding material may be treated to have a relatively low coefficient of friction.

[0030] The illustrated low friction surface treatment 90 extends along substantially the entire length of the first side 20. Preferably, the low friction surface treatment is elongate and extends through at least a portion of the lower leg and knee portions 96, 98 of the first side 20. Also, it is to be understood that the low friction surface treatment can comprises a plurality of layer portions that may or may not be spaced apart from one another.

[0031] In other embodiments, the low friction surface treatment may comprise larger layer portions than those illustrated in FIGURES 1-4. For example, in one embodiment, the first side 20 of the leg protection member 10 comprises a plurality of large, low friction surfaces disposed on hinged padding segments substantially similar to the upper 40, lower 36 and toe 34 hinged padding segments of the second side 22. It is contemplated that these large low friction surfaces generally cover the entire surface area of the first side. In another embodiment, the leg protection member has a single first side padding segment extending along the entire length of the first side 20, and a single low friction surface treatment extends along at least a portion of the segment. The segment and surface treatment may advantageously be formed of materials that facilitate flexion of the knee and ankle. In still other embodiments, the low friction surface treatment may comprise layer portions smaller than those illustrated herein. It will be appreciated that, depending on the particular level of friction and maneuverability desired, the size, number and positions of the low friction surface treatments on the leg protection member may advantageously be varied from those illustrated and discussed in connection with FIGURES 1-4.

[0032] In the illustrated embodiment, the low friction surface treatment 90 is disposed along the entire first side 20, which is the inner side of the leg protection member 10. As such, the coefficient of friction of the first side 20 is less than that of the front 12 and second side 22 of the leg protection member 10. It is to be understood that, in other embodiments, the second side may also include a low friction surface treatment.

[0033] During game play, the leg protection member 10 protects the goalkeeper's legs from incoming players and/or implements while allowing flexion of the player's knee

and ankle. Further as the goalkeeper drops to one or more knees with his feet spread, the first side contacts the dry playing surface. Preferably, the first side 20 is configured to be generally flat, and thus the first side 20 engages and is generally flush with the playing surface. As such, there is no room for a puck to pass between the protection member 10 and the playing surface, and the goalkeeper can thus block a puck traveling over the dry playing surface. However, since the coefficient of friction of the first side surface is relatively low, the goalkeeper can shift his position by sliding the leg protection member 10 along the playing surface. The low friction surface treatment 90 enables the goalkeeper to slide the first side 20 of the leg protection member over the playing surface even when the protection member 10 is supporting at least some of the goalkeeper's weight. Thus, the protection member 10 does not have to be unloaded before it will slide readily over the playing surface.

[0034] In the illustrated embodiment, low friction surface treatments are disposed on the inner leg of goalkeeper leg protection members. However, it is to be understood that other, non-goalkeeper hockey players may sometimes wish to slide along a dry playing surface in order to block a puck. Thus, in another embodiment, a pair of hockey pants have a low friction surface treatment disposed along an outer leg side of the pants. As such, a player can readily slide over the playing surface without injury and without coming to a sudden stop. In this embodiment, the low friction surface treatment is not necessarily disposed on a padding segment.

[0035] Although the embodiments discussed herein are contemplated for use in connection with hockey, it is contemplated that embodiments having aspects as discussed above can be used in connection with other sports and other applications.

[0036] Although certain preferred embodiments and examples have been disclosed, it will be understood by those skilled in the art that the present invention extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses of the invention and obvious modifications and equivalents thereof. In addition, while a number of variations of the invention have been shown and described in detail, other modifications, which are within the scope of this invention, will be readily apparent to those of skill in the art based upon this disclosure. It is also contemplated that various combinations or subcombinations of the specific features and aspects of the embodiments

may be made and still fall within the scope of the invention. Accordingly, it should be understood that various features and aspects of the disclosed embodiments can be combined with or substituted for one another in order to form varying modes of the disclosed invention. Thus, it is intended that the scope of the present invention herein disclosed should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the claims that follow.